Sheet 1 - 2 Sheets

O. P. Drake,

Apparatus for Carburetting Air,

No. 54,132, Patented Apr. 24, 1866.

Fig. 1.

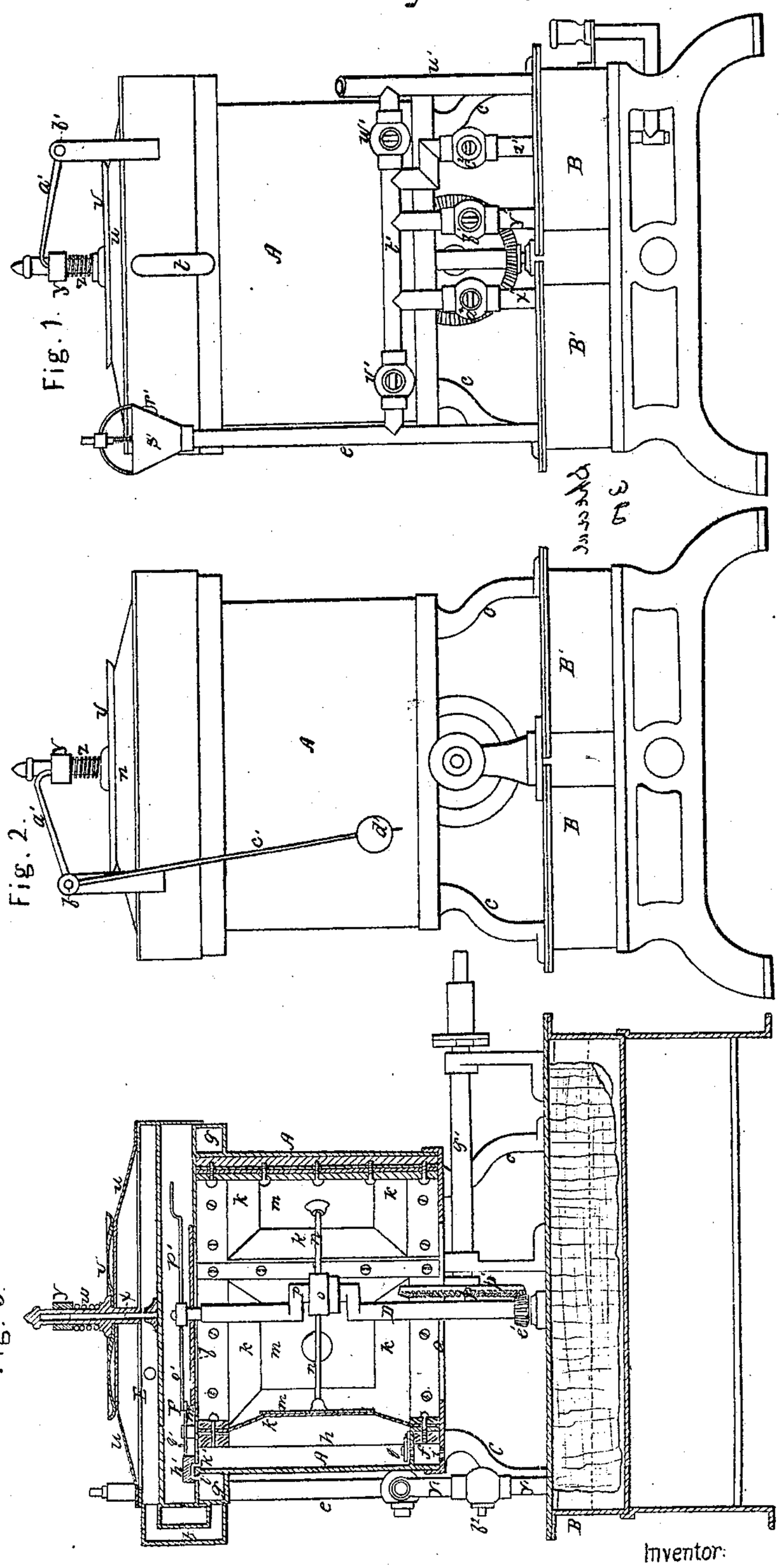


Fig. 2.

Fig. 3.

Fig. 5.
Sectional View

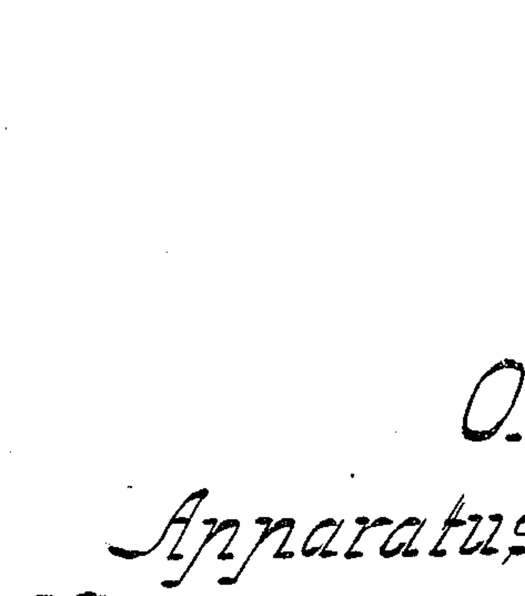


Fig. 6.

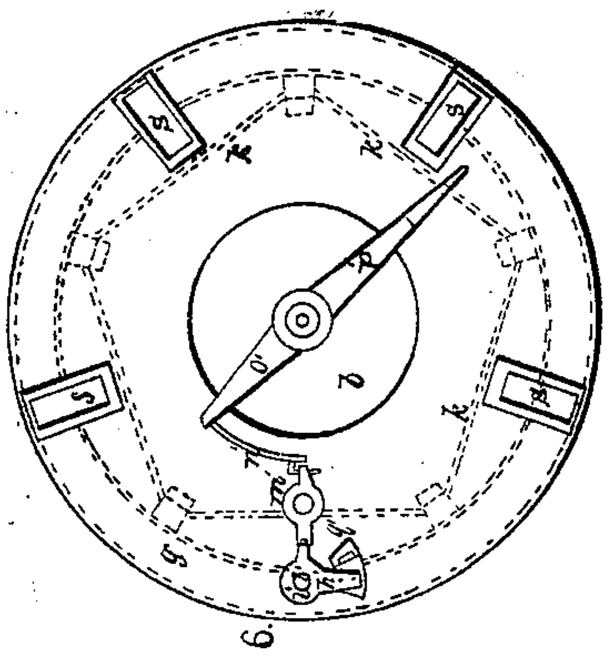
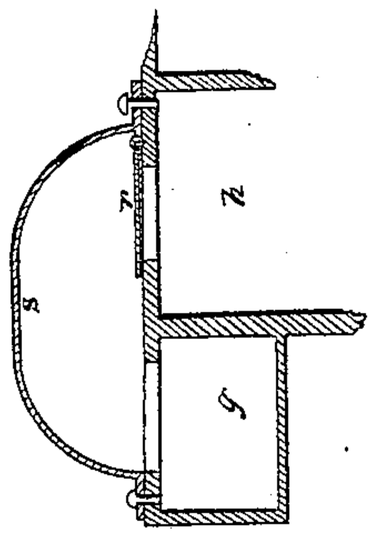


Fig. 7.



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Samuel A. Piper.

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by his attorney.
R. Mackay.

Sheet 2 2 Sheets

O. P. Drake,

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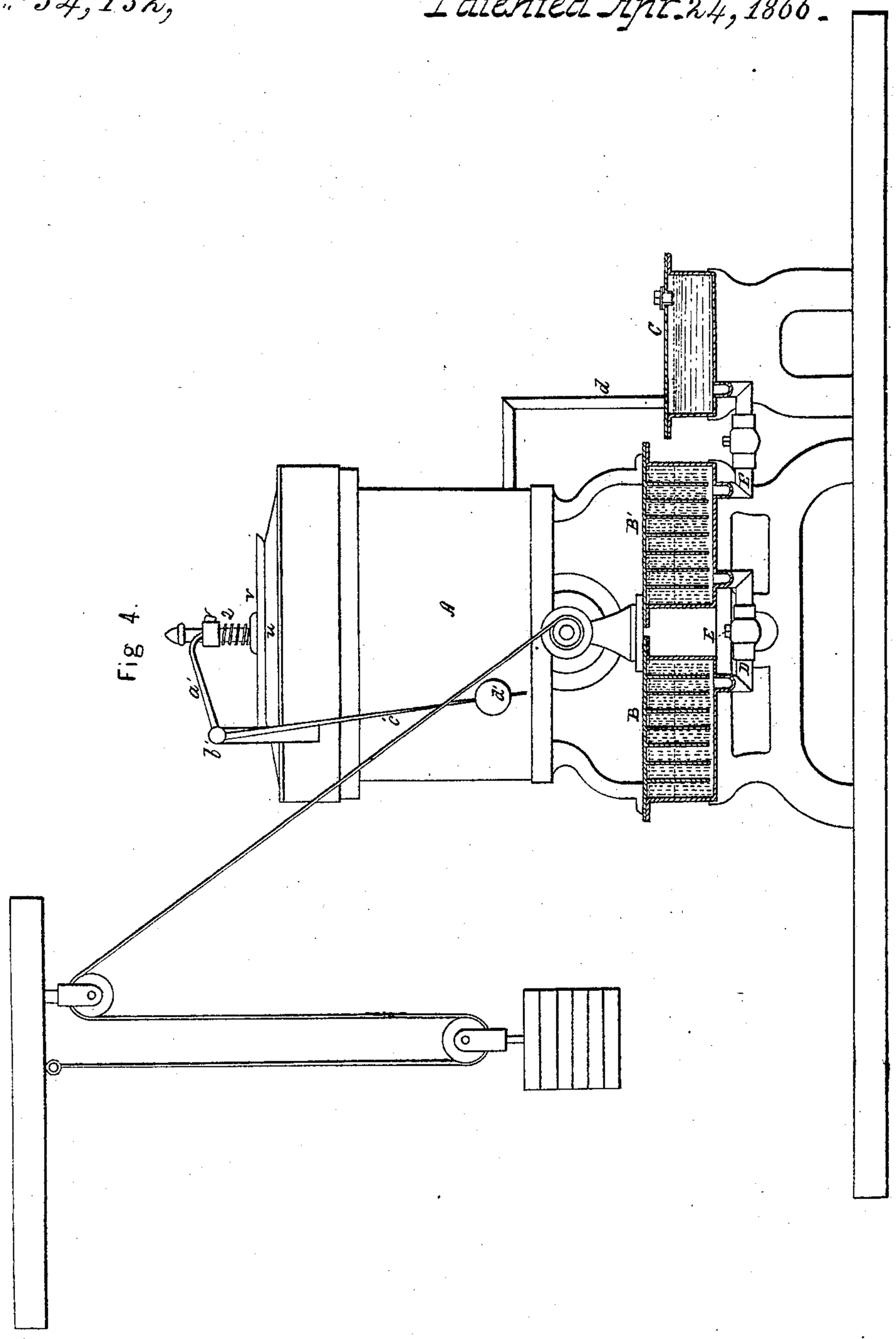

Fig 4.

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UNITED STATES PATENT OFFICE.

OLIVER P. DRAKE, OF BOSTON, MASSACHUSETTS.

IMPROVEMENT IN APPARATUS FOR CARBURETING AIR.

Specification forming part of Letters Patent No. **54,132**, dated April 24, 1866.

To all whom it may concern:

Be it known that I, OLIVER P. DRAKE, of Boston, in the county of Suffolk and State of Massachusetts, have invented an Improved Air-Carbureting Apparatus; and I do hereby declare the same to be fully described in the following specification and represented in the accompanying drawings, of which—

Figures 1 and 2 are end elevations, and Fig. 3 a vertical section, of it, the said figures not exhibiting the supply-cistern, which, in its due relation to the vaporizer of the apparatus, is represented in Fig. 4, which shows an end elevation of the air-forcing apparatus, together with a transverse section of the vaporizer and the said supply-cistern. Fig. 5 is a horizontal section of the air-forcing apparatus. Fig. 6 is a view of the valve-plate constituting the top of the air-forcing apparatus. Fig. 7 is a section of one of the valve-chests and the annular air-passage of the said valve-plate.

The air-forcing portion of the above-mentioned air-carbureting apparatus is of a peculiar construction, and may be thus described: A is a hollow drum, provided with a circular opening, *a*, in its bottom and another opening, *b*, in its top, and having its axis arranged vertically. This drum, by means of legs *cccc*, is supported on two separate vaporizers, B B′, which are arranged in one horizontal plane with each other and a supply-tank, C. The two vaporizers are connected by a pipe, B, (see Fig. 4,) leading from the bottom of one to that of the other, and they are also connected with the supply-tank by another such pipe, E, which leads from the lower part of the second vaporizer, B′, to that of the supply-tank C, the same being so that a hydrocarbon liquid, when in the tank, may freely flow therefrom into the vaporizers and stand at the same level therein as it may in the tank. A pipe, *d*, leads from the tank to and opens into an air-pipe, *e*, to be hereinafter described, the object of the pipe *d* being to admit air into the gasoline or hydrocarbon tank, in order that there may be a free flowage of the liquid therefrom.

Within the lower part of the drum A there is an annular air-passage, *f*, and there is also another such passage, *g*, at the upper end of the drum and encircling it. A series of separate chambers, *h h*, are formed against the inner periphery of the drum, and directly over the air-passage *f*, which should have an opening, *i*, leading through its bottom, in order to allow air to freely enter the said passage.

The inner side, *k*, of each chamber *h* is to be composed of an air-tight flexible sheet—such as india-rubber cloth, for instance—which should be attached to a plate, *m*. To each of the said plates *m* one of a series of pitmen or rods, *n*, is jointed, the said rods being connected with or jointed to an annulus, *o*, which encompasses the wrist of a bell-crank, *p*, of an upright shaft, D, arranged in the axis of the drum A, in manner as represented in Fig. 3. Each of such chambers *h* is, in fact, a bellows, which is put in action by the shaft D while in revolution. There should be a valve-opening and valve thereto at the bottom of each of the said bellows, the same being as shown at *q* in Fig. 3. Another such valve and opening should be arranged at the top of each bellows, the same being as shown at *r* in Fig. 7, in which the valve is exhibited as placed within a chest, *s*, which opens into the annular passage *g*. In Fig. 6 the arrangement of the several valve-chests *s* is exhibited.

By means of a pipe, *t*, (see Figs. 1 and 3,) the passage *g* communicates with an aerometer, E, arranged above the air-forcing apparatus and separated from it by an intervening cylindrical space, F. (See Fig. 3.)

The cap *u* of the aerometer is of an air-tight flexible material, such as a sheet of india-rubber, and is secured at its outer edge to the sides of the aerometer, while at its middle it is connected to a metallic plate, *v*, provided with a tubular hub, *w*, to encompass and slide vertically on a standard, *x*, erected on the bottom of the aerometer. An annulus, *y*, surrounding the upper part of the said hub *w*, rests on a helical spring, *z*, which also encircles such hub and rests on a shoulder making part of it. A forked arm, *a′*, extending from a horizontal shaft, *b′*, arranged as shown in the drawings, rests on the top of the annulus *y*. Another arm, *c′*, provided with a weight, *d′*, at its lower end, extends downward from the shaft *b′*, as shown in Figs. 2 and 4.

The object of the counterbalancing apparatus, composed of the spring *z*, annulus *y*, arm *a′*, shaft *b′*, arm *c′*, and weight *d′*, applied to the head or plate *v* of the flexible top of the aerometer, is to prevent the cap-plate of such

top from being thrown up too high by the pressure of the air within the aerometer, the flexible top always requiring to be in such a state as to admit of its plate being moved either up or down. Besides this the counterbalancing apparatus serves to equalize the pressure of the gas or carbureted air at the burners, or, in other words, it operates to maintain the flame of each burner steady or at a constant height.

The shaft D is provided with a beveled pinion, e', which engages with a beveled gear, f', fixed on a shaft, g', which is to be supplied with a suitable means of putting it in constant revolution while it may be necessary to keep the apparatus in operation.

Instead of the valve-openings and valves q r and valve-chest s, applied to each bellows in manner as hereinbefore described, such bellows may be provided with a valve operated automatically, the same being shown in Figs. 3 and 6, in which h' denotes the said valve, which is a box open at bottom and fixed to a lever turning on a fulcrum, i'. This valve operates with two ports, k' l', (shown in Fig. 3,) and is intended to move on and off one of them—viz., that one which leads out of the bellows.

The shorter arm of the lever of the box-valve has a pin, q', extended upward from it, which enters the forked arm of another lever, m', whose other arm works with a spring-catch, n', extended from the upper head of the drum A.

Two arms, o' p', of different lengths, are projected from the top of the shaft D in manner as shown in Figs. 3 and 6, each being so formed as to depress the spring-catch n while passing over it, in order to release the lever m'. During its revolution the longer arm, p', will so act against the pin q' as to move the valve off the port k', whereby air will be allowed to enter the bellows. The arm o', while passing the spring-latch, will, by its action against the lever m', cause the valve to be moved back or over the two ports k' l', in order that air previously drawn into the bellows may be expelled therefrom through such ports and the valve and into the passage g, from whence such air will flow into the aerometer E. From the aerometer the air passes, by a pipe, r', (see Fig. 1,) into a valve-case or flame-regulator, s', and from thence, by a pipe, e, into the vaporizer B'. This flame-regulator forms no part of my present invention, it containing a valve which is suspended from a flexible disk forming the top of the case.

A pipe, t', opens out of and runs horizontally from the pipe e and over the two vaporizers B' B', and opens into a vertical discharge-pipe, w', leading out of the vaporizer B. There are two stop-cocks, v' w', arranged in the pipe t', and between them are three vertical pipes, x' y' z', which open out of and lead down from the pipe t'. The pipe x' opens into the discharging end of the vaporizer B'. The pipe y' leads out of the receiving-extremity of the vaporizer B. The pipe z' leads out of the middle of the tortuous passage of the said vaporizer B, it being understood that each of such vaporizers, by means of partitions duly arranged within it, has a tortuous or serpentine passage formed in it, whereby air, when driven into the vaporizer, is made to course through such passage against absorbent surfaces or materials impregnated with a liquid hydrocarbon. Finally, such air duly carbureted passes to the burner or burners by means of the pipe u'.

By closing the stop-cocks v', w', and c^2 and opening the stop-cocks a^2 b^2, the air to be carbureted will be made to flow through the vaporizer B', thence through the pipe x' and into the pipe t', thence down the pipe y', and into and through the entire circuit of the vaporizer B. But in case it may be desirable to have the air forced through the vaporizer B without first going through the vaporizer B', we have only to close the cocks a^2, c^2, and w' and open the cocks v' and b^2. So, in case it may be desirable to have the air go through but half of the vaporizer B, we can accomplish such provided we close the cocks a^2, b^2, and w' and open the cocks v' and c^2. Again, in case we may desire to cause the air to go through one vaporizer and but half of the other, we have only to close the cocks w' and b^2 and open the cocks v', a^2, and c^2. By opening the cocks v' and w' the air will pass into the pipe u' without going through the vaporizers.

From the above it will be seen that by having one or more vaporizers and a system of pipes, t' x' y' z', provided with stop-cocks v', a^2, b^2, c^2, and w', we are enabled to accomplish results as set forth—that is, to use one or both vaporizers at once, or one and a portion of the other, or only such portion of the other.

Therefore I claim as my invention—

1. The combination as well as the arrangement of one or more vaporizers, B' B, their induction and eduction pipes e u', and a system of pipes, t' x' y' z', and stop-cocks so arranged as to enable the air to be driven either through the whole of such vaporizer or vaporizers, or a portion or portions thereof.

2. The improved air-forcing apparatus, composed of the drum A and the series of flexile sheets k, as explained, and having mechanism, substantially as described, for operating them by means of a cranked shaft, such mechanism being the annulus o (applied to the crank p) and the series of rods n n, connecting such annulus with the movable plates m m of the several bellows.

3. The improved flexile-top aerometer E, having the cap w and guide x, combined and arranged with its disk v and flexile top u, as specified.

4. The combination as well as the arrangement of the air-forcing apparatus, the annular channel g, and the aerometer E.

5. The combination as well as the arrangement of the chamber F, the annular channel *g*, the air-forcing apparatus, and the aerometer.

6. The automatic combination, arranged in the chamber F and for operating the lever-valve *h'*, the same consisting of the pin *q'*, the lever *m'*, catch *n'*, and the arms *o' p'*, applied to the shaft D.

7. The combination of the weight *d'*, rod *c'*, shaft *b'*, arm *a'*, annulus *y*, and spring *z*, or the equivalent thereof, with the aerometer E, constructed substantially as described.

8. The arrangement of the supply-tank C and its communicating-pipe E with the vaporizer B'.

9. The combination of the air-pipe *d* with the air-forcing apparatus, or its pipe *e*, and the supply-tank C, arranged and connected with the vaporizer, as set forth.

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